

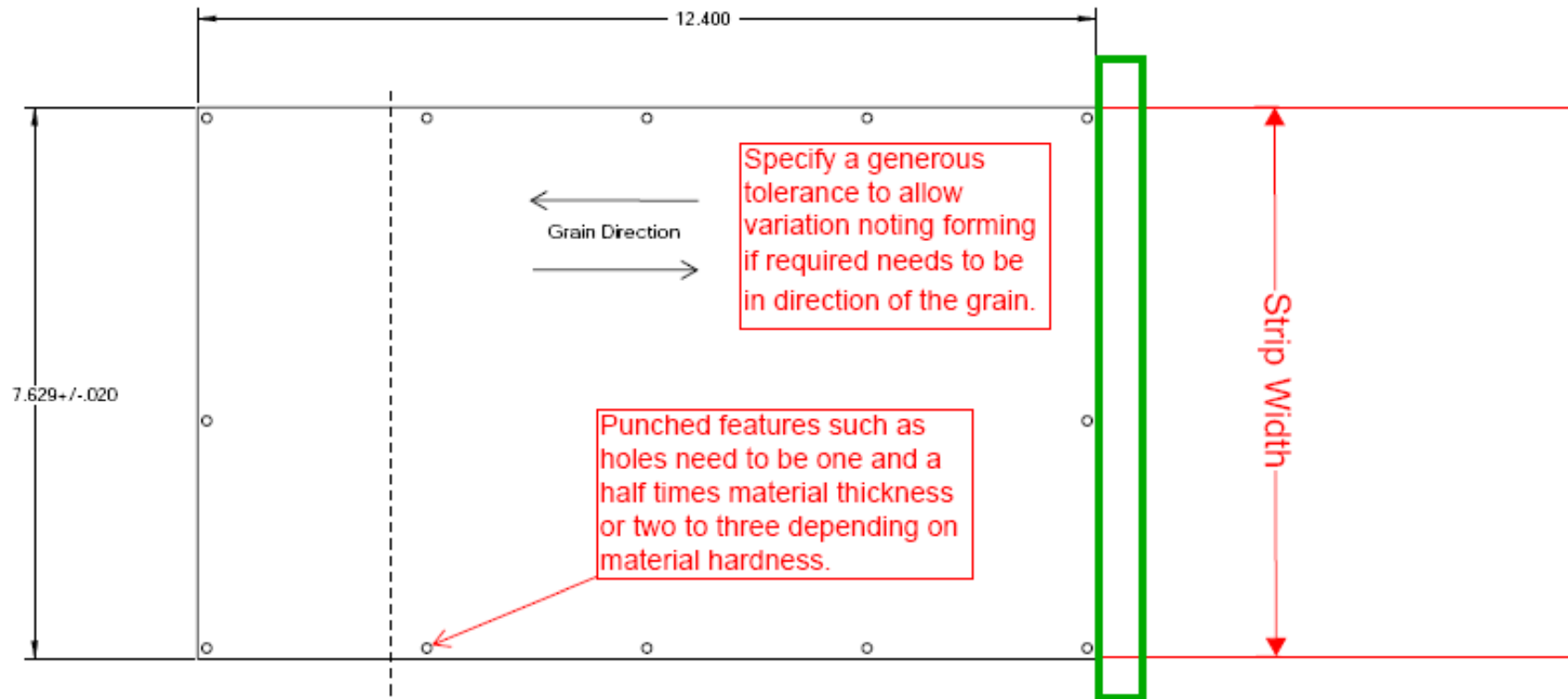
REPORT DOCUMENTATION PAGE				<i>Form Approved</i> OMB No. 0704-0188	
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				5c. PROGRAM ELEMENT NUMBER	
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				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
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14. ABSTRACT <p>Improved dimensional stability for laser welding with interlocking cutouts on the edges rather than internal return flanges.</p> <p>Forming heavy gage 17-4 can be achieved by annealing to red hot 1900 F then air cool down to manageable 800 F rather than 800 F as suggest in the material data sheet. While plates were formed consideration for bulging, tolerance capabilities and slow throughput resulting in higher component costs. issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.</p>					
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Nu-Way Industries, Inc.

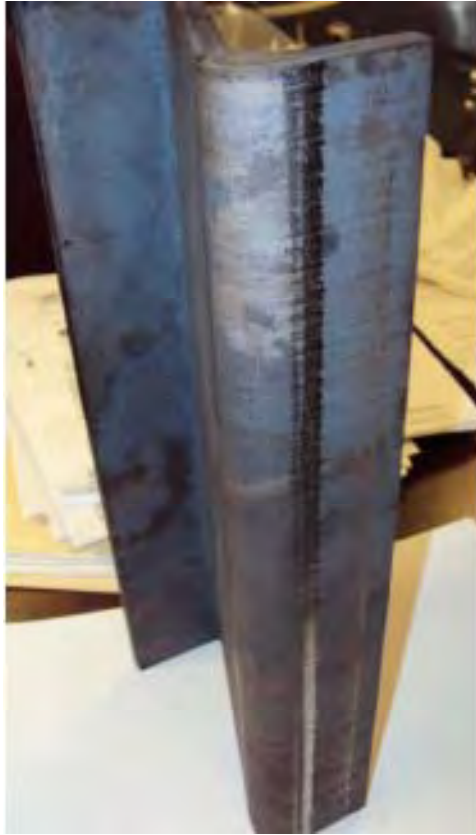
Final Report
Agreement 2011-303
10-01-INIT575

June 30th 2011

Parameters for stamping 17-4 with cutoff scrap only

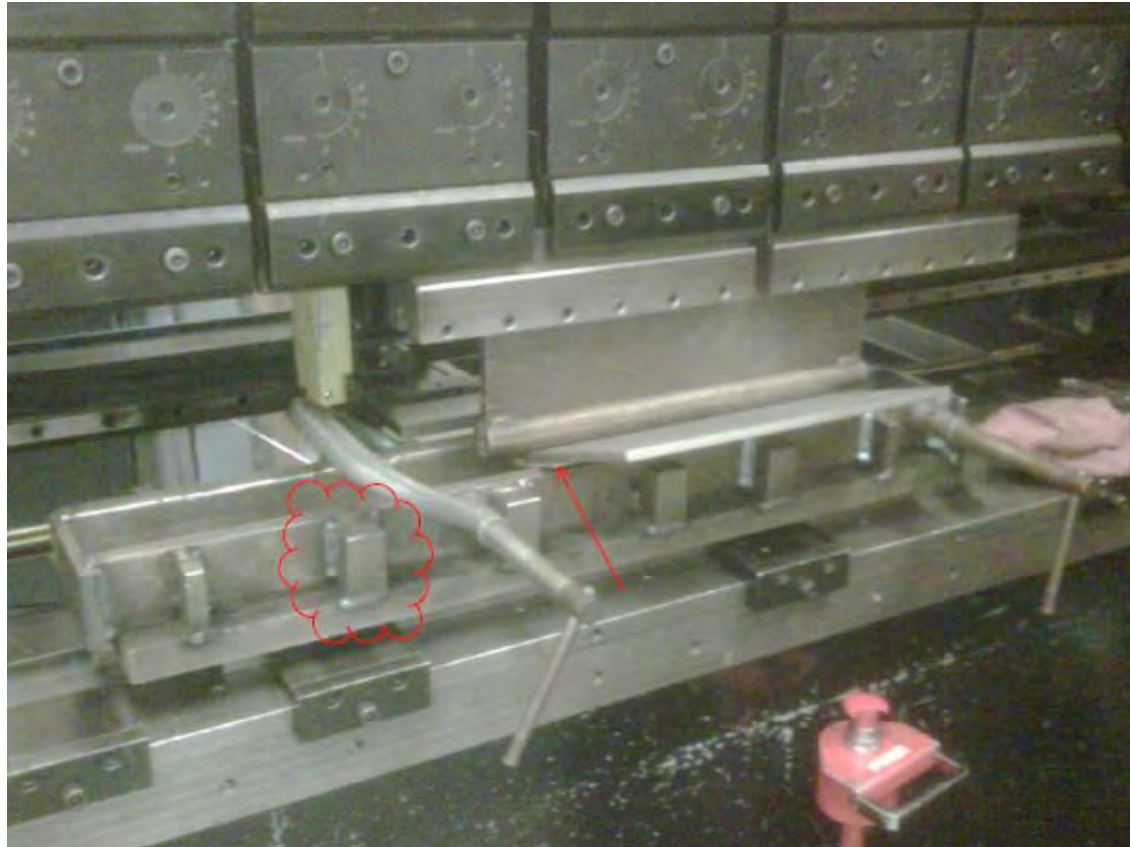


Heavy Gage 17-4 Forming



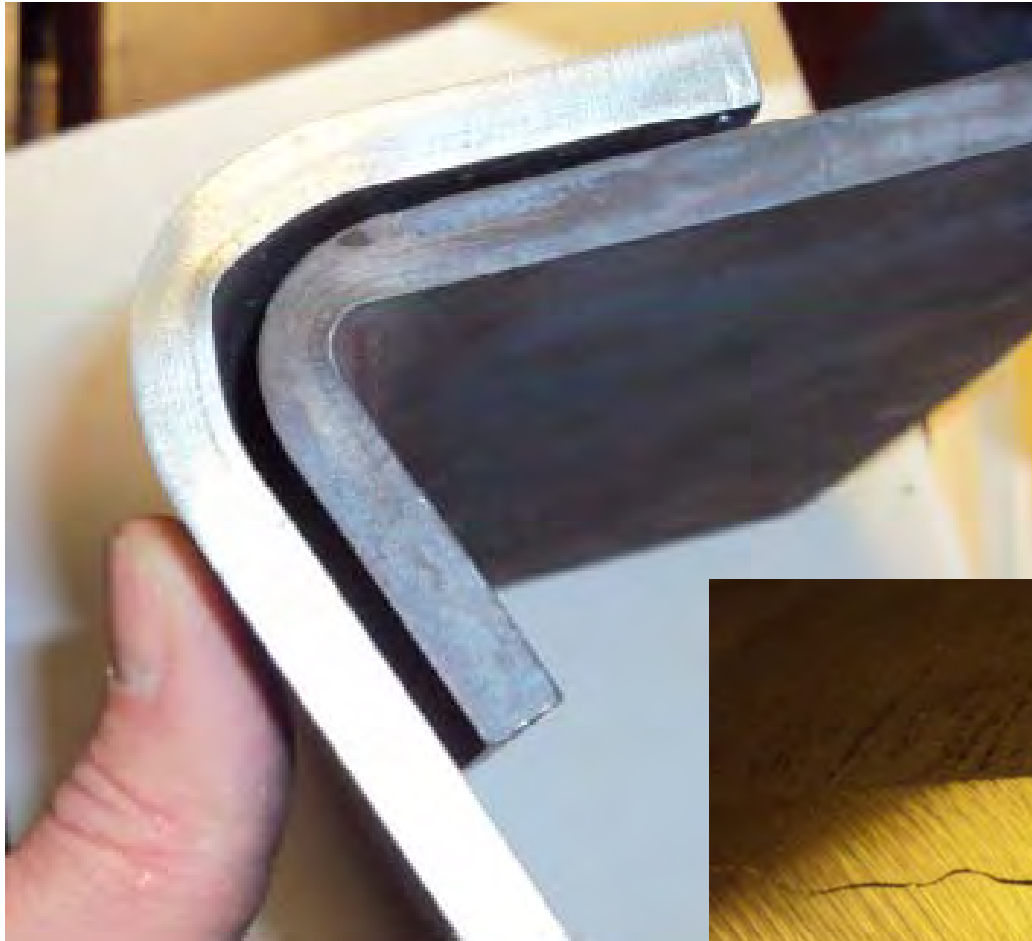
Forming heavy gage 17-4 can be achieved by annealing to red hot 1900 F then air cool down to manageable 800 F rather than 800 F as suggest in the material data sheet. While plates were formed consideration for bulging, tolerance capabilities and slow throughput resulting in higher component costs.

Heavy Gage 17-4 Forming



The forming fixture required weld gussets for support and plates had to be formed with a sub-plate to reduce stress and fracturing.

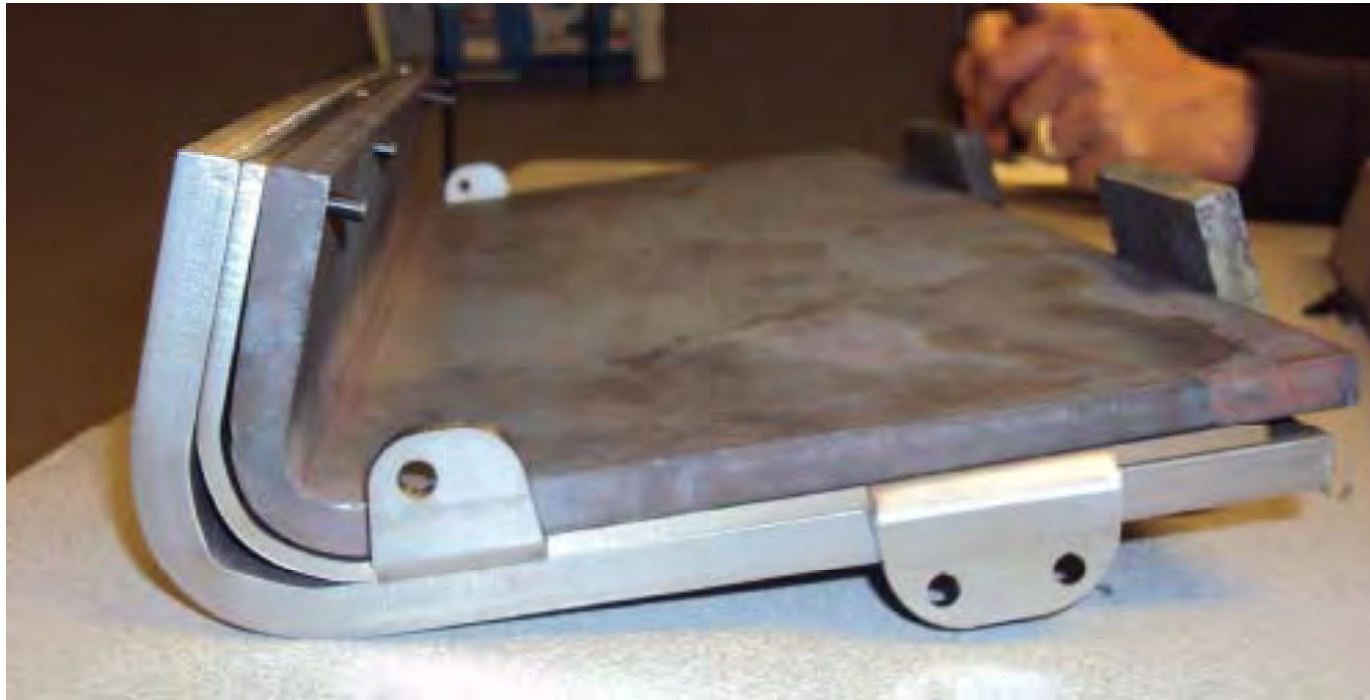
Heavy Gage 17-4 Forming



Some of the issue are inconsistent forms angles and variation of the material thickness through the bend and metal fatigue on over bends past 90 degrees.



Heavy Gage 17-4 Forming



Tolerances stack-up became a issue because of the inconsistent forms angles and variation of the material thickness through the bend.

Heavy Gage 17-4 Forming



The solution for the first six samples was to match each component of the tile by welding on strips to build back up the material to match the rails where the thickness variation resulted in gaps.

Transformation of Tile to Eliminate Forming



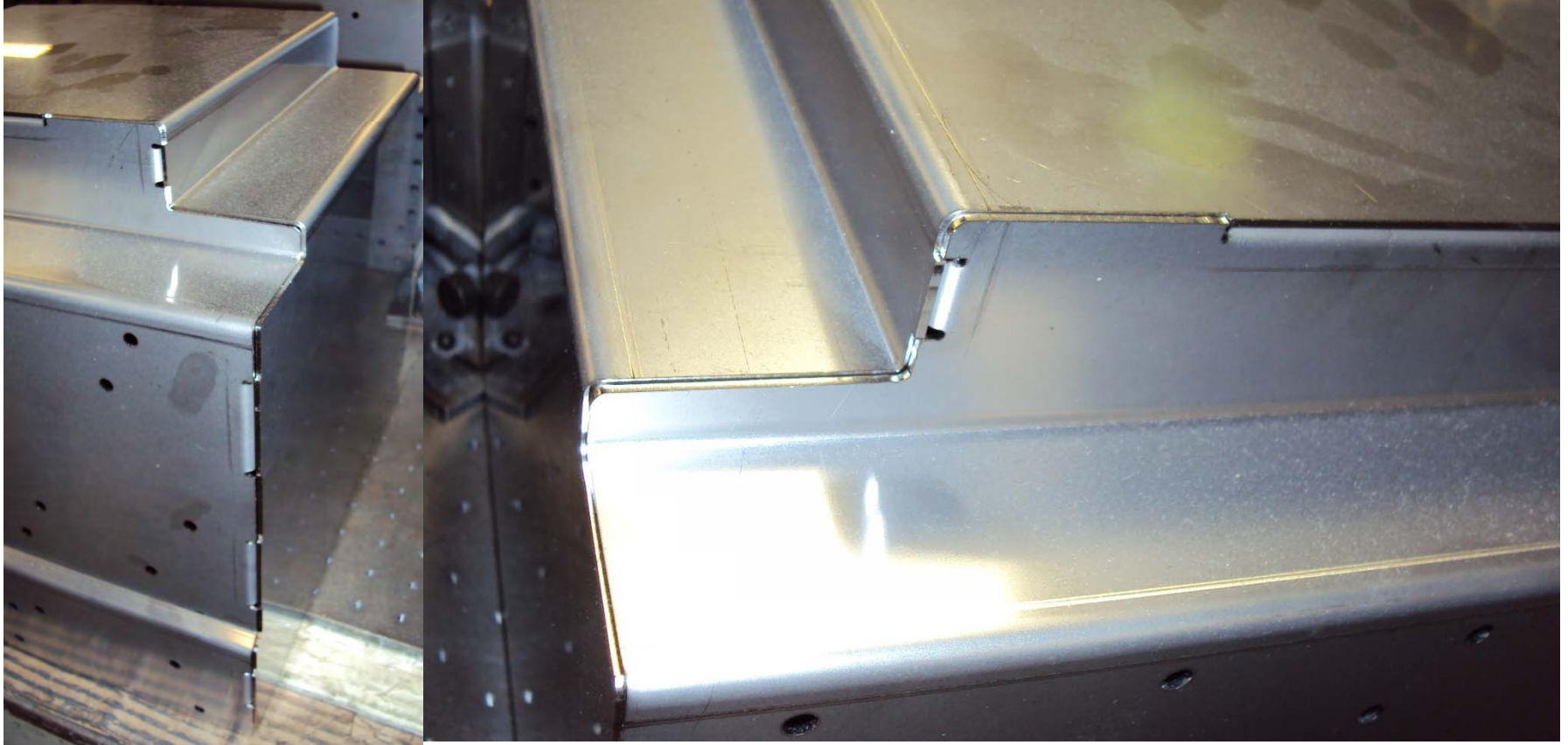
Flat 17-4 tile plates welded to .030" $\frac{1}{4}$ hard stainless steel

Transformation of Tile to Eliminate Forming



Flat 17-4 tile plates welded to .030" ¼ hard stainless steel with
formed rails between for internal casing

Precision Component Forming



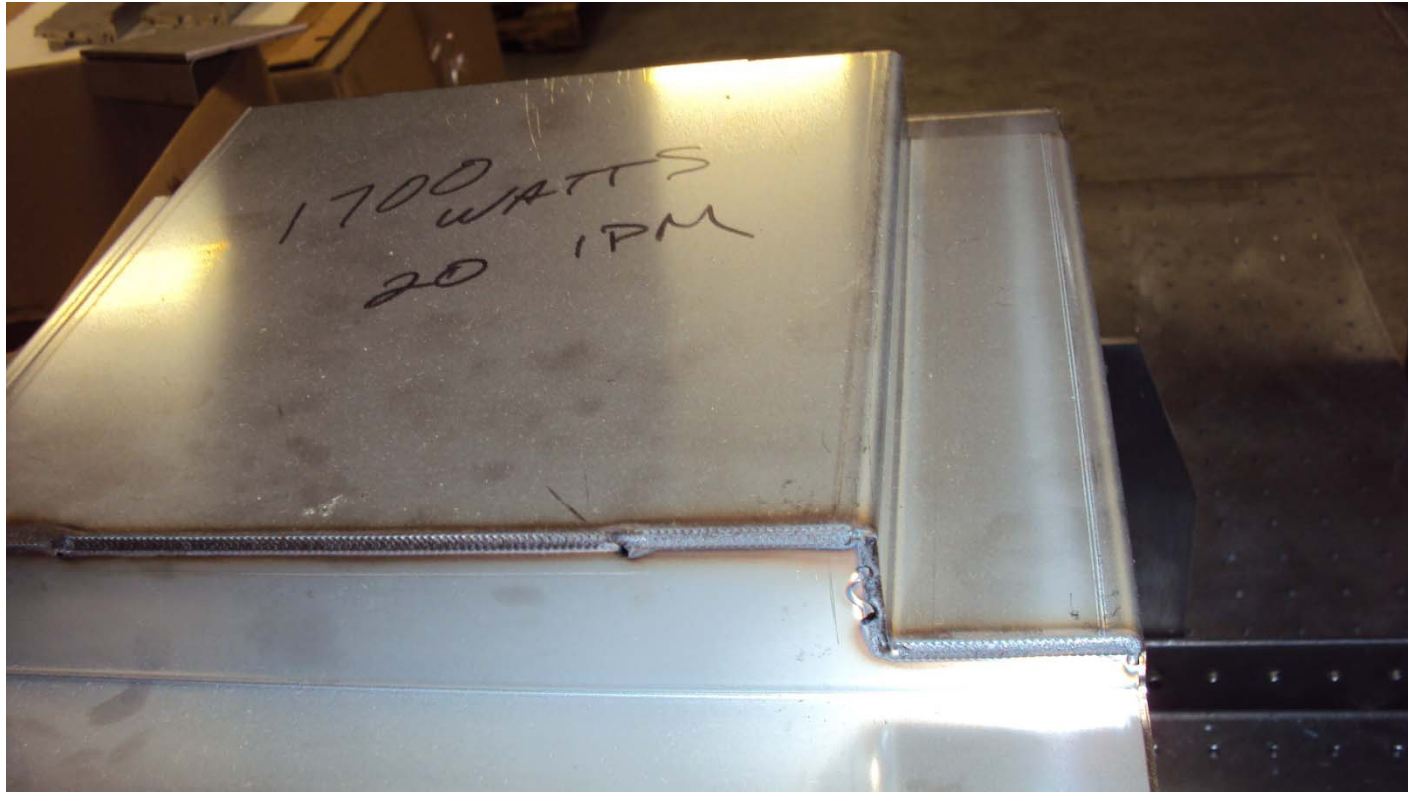
Mating of Housing components with interlocking features and fit up edges and corners

Precision laser weld fixture



Weld fixture for precision feature location

20 inches per minute laser weld



Laser weld result that could be improved with interlocking cutouts on the edges rather than internal return flanges.